

What is claimed is:

1. A temperature estimation apparatus, comprising:  
2        state detection means for detecting a value of a  
3        state variable which correlates with a temperature of a  
4        part to have its temperature detected;  
5        memory means for prestorage therein correspondence  
6        information which indicate corresponding relations between  
7        detected results of said state detection means and  
8        temperatures of the part for the temperature detection; and  
9        estimation means for estimating the temperature of  
10      said part for said temperature detection by referring to  
11      the correspondence information on the basis of the detected  
12      result of said state detection means.

2. A temperature estimation apparatus as defined in  
1        claim 1, wherein:

3        said part for said temperature detection is a  
4        catalyst which cleans exhaust gas of an engine; and  
5        said state variable includes at least one member  
6        which is selected from the group consisting of a quantity  
7        of intake air, a quantity of fuel injection and r. p. m.  
8        (revolutions per minute) of the engine.

1        3. A method of estimating a temperature of a  
2        catalyst, comprising the steps of:

prestoring corresponding relations between temperatures of the catalyst which cleans exhaust gas of an engine and values of a state variable which correlates with the temperatures of said catalyst; and

detecting an actual value of the state variable, and then comparing the detected value with the stored corresponding relations, thereby estimating the temperature of said catalyst.

#### 4. A catalyst-deterioration diagnostic system for diagnosing a deterioration state of a catalyst, comprising:

index means for obtaining a value of an index which is used for deciding the deterioration state of the catalyst;

catalyst state estimation means for estimating a state of said catalyst at a time at which said index means has obtained the index value, as to a physical quantity which affects a catalytic action of said catalyst;

correction means for correcting said index value obtained by said index means, to a value in a standard state of said catalyst previously set as to the physical quantity, by the use of the estimated result of said catalyst state estimation means; and

decision means endowed with a preset criterion value, and for deciding said deterioration state of said

17 catalyst by comparing the index value corrected by said  
18 correction means, with the criterion value.

1 5. A catalyst-deterioration diagnostic system for  
2 diagnosing a deterioration state of a catalyst, comprising:  
3 index means for obtaining a value of an index  
4 which is used for deciding the deterioration state of the  
5 catalyst;

6 decision means endowed with a preset criterion  
7 value, and for deciding said deterioration state of said  
8 catalyst by comparing the index value obtained by said  
9 index means, with the criterion value;

10 catalyst state estimation means for estimating a  
11 state of said catalyst at a time at which said index means  
12 has obtained said index value, as to a physical quantity  
13 which affects a catalytic action of said catalyst; and

14 suspension means endowed with a predetermined  
15 range concerning the physical quantity, and for causing  
16 said decision means to suspend the decision on condition  
17 that a value of said physical quantity obtained by said  
18 catalyst state estimation means is outside the  
19 predetermined range.

1 6. A catalyst-deterioration diagnostic system for  
2 diagnosing a deterioration state of a catalyst as defined  
3 in claim 4, wherein:

4               said catalyst serves to eliminate noxious  
5        substances which are contained in exhaust gas of an  
6        engine; and

7               said catalyst state estimation means includes;  
8               operating-situation detection means for  
9        detecting a value of that state variable of the engine  
10      which correlates with said physical quantity;

11               memory means for storing therein  
12      correspondence information which indicate correlations  
13      between values of the state variable and those of said  
14      physical quantity; and

15               arithmetic means for determining a value of  
16      said physical quantity by referring to the correspondence  
17      information on the basis of the detected result of said  
18      operating-situation detection means.

1               7.. A catalyst-deterioration diagnostic system for  
2        diagnosing a deterioration state of a catalyst as defined  
3        in claim 5, wherein:

4               said catalyst serves to eliminate noxious  
5        substances which are contained in exhaust gas of an  
6        engine; and

7               said catalyst state estimation means includes;  
8               operating-situation detection means for  
9        detecting a value of that state variable of the engine  
10      which correlates with said physical quantity;

memory means for storing therein correspondence information which indicate correlations between values of the state variable and those of said physical quantity; and

arithmetic means for determining a value of said physical quantity by referring to the correspondence information on the basis of the detected result of said operating-situation detection means.

8. A catalyst-deterioration diagnostic system for diagnosing a deterioration state of a catalyst, wherein the catalyst serves to eliminate noxious components which are contained in exhaust gas of an engine; comprising:

index means for obtaining a value of an index which is used for deciding the deterioration state of said catalyst;

operating-situation detection means for detecting a value of that state variable of the engine which correlates with a physical quantity affecting a catalytic action of said catalyst;

correction means for correcting the index value obtained by said index means, to a value in a standard state of said catalyst previously set as to the physical quantity, by the use of the detected result of said operating-situation detection means; and

17                   decision means endowed with a preset criterion  
18                   value, and for deciding said deterioration state of said  
19                   catalyst by comparing the index value corrected by said  
20                   correction means, with the criterion value.

1                   9. A catalyst-deterioration diagnostic system for  
2                   diagnosing a deterioration state of a catalyst, wherein the  
3                   catalyst serves to eliminate noxious components which are  
4                   contained in exhaust gas of an engine; comprising:  
5                   index means for obtaining a value of an index  
6                   which is used for deciding the deterioration state of said  
7                   catalyst;

8                   decision means endowed with a preset criterion  
9                   value, and for deciding said deterioration state of said  
10                   catalyst by comparing the index value obtained by said  
11                   index means, with the criterion value;

12                   operating-situation detection means for detecting  
13                   a value of that state variable of the engine which  
14                   correlates with a physical quantity affecting a catalytic  
15                   action of said catalyst; and

16                   suspension means endowed with a predetermined  
17                   range concerning the state variable, and for causing said  
18                   decision means to suspend the decision on condition that  
19                   the value of said state variable detected by said  
20                   operating-situation detection means is outside the  
21                   predetermined range.

1           10. A catalyst-deterioration diagnostic system as  
2       defined in claim 5, further comprising:  
3               alarm means for giving an alarm for the suspension  
4       of said decision when said decision has been suspended by  
5       said suspension means.

1           11. A catalyst-deterioration diagnostic system as  
2       defined in claim 9, further comprising:  
3               alarm means for giving an alarm for the suspension  
4       of said decision when said decision has been suspended by  
5       said suspension means.

1           12. A catalyst-deterioration diagnostic system for  
2       diagnosing a deterioration state of a catalyst, wherein the  
3       catalyst serves to eliminate noxious components which are  
4       contained in exhaust gas of an engine; comprising:  
5               index means for obtaining a value of an index  
6       which reflects the deterioration state of said catalyst;  
7               operating-situation detection means for detecting  
8       a value of that state variable of the engine which  
9       correlates with a physical quantity affecting a catalytic  
10      action of said catalyst;  
11               correction means for correcting the value  
12      detected by said operating-situation detection means, to a  
13      value in a standard state of said catalyst previously set

14 as to the index, by the use of the index value obtained by  
15 said index means; and  
16 decision means endowed with a preset criterion  
17 value, and for deciding said deterioration state of said  
18 catalyst by comparing the value corrected by said  
19 correction means, with the criterion value.

1 13. A catalyst-deterioration diagnostic system as  
2 defined in claim 6, wherein:  
3 the physical quantity is a temperature of said  
4 catalyst; and  
5 said state variable includes at least one member  
6 which is selected from the group consisting of a quantity  
7 of intake air, a quantity of fuel injection and r. p. m.  
8 (revolutions per minute) of the engine.

1 14. A catalyst-deterioration diagnostic system as  
2 defined in claim 8, wherein:  
3 the physical quantity is a temperature of said  
4 catalyst; and  
5 said state variable includes at least one member  
6 which is selected from the group consisting of a quantity  
7 of intake air, a quantity of fuel injection and r. p. m.  
8 (revolutions per minute) of the engine.

1        15. A catalyst-deterioration diagnostic system as  
2        defined in claim 9, wherein:

3                the physical quantity is a temperature of said  
4        catalyst; and

5                said state variable includes at least one member  
6        which is selected from the group consisting of a quantity  
7        of intake air, a quantity of fuel injection and r. p. m.  
8        (revolutions per minute) of the engine.

1        16. A catalyst-deterioration diagnostic system as  
2        defined in claim 12, wherein:

3                the physical quantity is a temperature of said  
4        catalyst; and

5                said state variable includes at least one member  
6        which is selected from the group consisting of a quantity  
7        of intake air, a quantity of fuel injection and r. p. m.  
8        (revolutions per minute) of the engine.